

MULTIFUNCTIONAL NETWORK INTERFACE NODE

CLAIMS

What is claimed:

- 1 1. A node for providing a common interface for a plurality of system devices
2 connected to a network, comprising:
3 (a) user-configurable software for providing a software interface for
4 said plurality of system devices; and
5 (b) multifunctional hardware for providing a hardware interface for said
6 plurality of system devices.
- 1 2. The node of claim 1, further comprising at least one system device
2 connected to said node, wherein said at least one system device is a digital
3 device, an analog device, or a serial device.
- 1 3. The node of claim 2, wherein said node provides a switching functionality,
2 whereby the voltage output of said system devices is standardized to a level
3 of about 0 to 5 voltz, about minus 5 to 5 voltz, or about minus 12 to 12 voltz.
- 1 4. The node of claim 2, wherein said node provides a switching functionality,
2 whereby the electronic communication formats of said system devices are
3 standardized to a single communication protocol.
- 1 5. The node of claim 1, further comprising at least one processing unit
2 connected to said node through said network for processing information
3 received from, and sending information to, said system devices.
- 1 6. The node of claim 1, wherein said plurality of system devices consists of
2 digital devices.

1 7. The node of claim 1, wherein said plurality of system devices consists of
2 analog devices.

1 8. The node of claim 1, wherein said plurality of system devices consists of
2 serial devices.

1 9. The node of claim 1, wherein said plurality of system devices consists of
2 digital devices, analog devices, serial devices, or combinations thereof.

1 10. The node of claim 1, wherein said network is a Controller Area Network.

1 11. The node of claim 1, wherein said network is any network compatible
2 with said node and said system devices.

1 12. The node of claim 1, wherein said user-configurable software is
2 expandable and updatable across said network.

1 13. The node of claim 1, wherein said user-configurable software further
2 comprises:

3 (a) an application manager layer for facilitating multiprocessing,
4 resource allocation, memory management and cooperation among
5 independent application modules;

6 (b) application modules layer for application-dependent processing of
7 system inputs and outputs; and

8 (c) a hardware abstraction layer to consolidate all hardware interfaces
9 accessible from application modules.

1 14. The node of claim 1, wherein said multifunctional hardware further
2 comprises:
3 (a) memory for storing said user-configurable software;
4 (b) a microprocessing subunit for controlling the operation of said
5 hardware as commanded by said user-configurable software;
6 (c) a plurality of inputs / outputs in communication with said
7 microprocessing subunit for connecting to said system devices, and
8 (d) a power supply.

1 15. The node of claim 14, wherein said memory further comprises a volatile
2 memory module and a non-volatile memory module.

1 16. The node of claim 14, wherein said microprocessing subunit further
2 comprises a microprocessor chip.

1 17. The node of claim 14, wherein said microprocessing subunit further
2 comprises an address and data bus interface in communication with said
3 memory.

1 18. The node of claim 14, wherein said microprocessing subunit further
2 comprises an asynchronous serial port in communication with a serial device
3 transceiver in communication with a high-speed serial interface connector.

1 19. The node of claim 14, wherein said microprocessing subunit further
2 comprises a synchronous serial port in communication with a synchronous
3 serial port interface connector.

1 20. The node of claim 14, wherein said microprocessing subunit further
2 comprises a background debugging monitor in communication with a
3 background debugging monitor interface connector.

- 1 21. The node of claim 14, wherein said microprocessing subunit further
2 comprises a network interface in communication with a network connector.
- 1 22. The node of claim 14, wherein said microprocessing subunit further
2 comprises an analog to digital converter in communication with an analog to
3 digital and digital I/O interface connector.
- 1 23. The node of claim 14, wherein said microprocessing subunit further
2 comprises a time processing unit in communication with a switch array in
3 communication with a digital I/O and serial interface connector.
- 1 24. The node of claim 14, wherein said plurality of inputs/outputs further
2 comprises a plurality of digital input/outputs.
- 1 25. The node of claim 14, wherein said plurality of inputs/outputs further
2 comprises a plurality of analog input/outputs.
- 1 26. The node of claim 14, wherein said plurality of inputs/outputs further
2 comprises a plurality of serial input/outputs.
- 1 27. The node of claim 14, wherein said plurality of inputs/outputs consists of
2 a plurality of digital input/outputs, analog input/outputs, serial input/outputs,
3 or combinations thereof.
- 1 28. The node of claim 14, wherein said power supply operates within a range
2 of about 8 to 32V DC.
- 1 29. The node of claim 14, wherein said power supply draws its power from
2 either an external power source or the power supply to said network, and
3 automatically chooses said external power supply when both sources of
4 power are available.

1 30. The node of claim 1, wherein all components of said node are ruggedized
2 to prevent damage resulting from use of said node in high shock or high
3 vibration environments.

1 31. The node of claim 1, wherein said node operates within a temperature
2 range of about minus 40⁰C to 85⁰C.

1 32. The node of claim 1, wherein said node is installed in landcraft, aircraft,
2 or watercraft.

1 33. A node for providing a common interface for a plurality of system devices
2 connected to a network, comprising:

3 (a) user-configurable software for providing a software interface for
4 said plurality of system devices wherein said user-configurable
5 software further comprises:

6 (1) an application manager layer for facilitating multiprocessing,
7 resource allocation, memory management and cooperation
8 among independent application modules;

9 (2) application modules layer for application-dependent
10 processing of system inputs and outputs; and

11 (3) a hardware abstraction layer to consolidate all hardware
12 interfaces accessible from application modules; and

13 (b) multifunctional hardware for providing a hardware interface for said
14 plurality of system devices, wherein said multifunctional hardware
15 further comprises:

16 (1) memory for storing said user-configurable software;

17 (2) a microprocessing subunit for controlling the operation of
18 said hardware as commanded by said user-configurable
19 software;

20 (3) a plurality of inputs / outputs in communication with said
21 microprocessing subunit for connecting to said system devices;
22 and

23 (4) a power supply.

1 34. The node of claim 33, further comprising at least one system device
2 connected to said node, wherein said at least one system device is a digital
3 device, an analog device, or a serial device.

1 35. The node of claim 33, wherein said node provides a switching
2 functionality, whereby the voltage output of said system devices is
3 standardized to a level of about 0 to 5 voltz, about minus 5 to 5 voltz, or
4 about minus 12 to 12 voltz.

1 36. The node of claim 33, wherein said node provides a switching
2 functionality, whereby the electronic communication formats of said system
3 devices are standardized to a single communication protocol.

1 37. The node of claim 33, further comprising at least one processing unit
2 connected to said node through said network for processing information
3 received from, and sending information to, said system devices.

1 38. The node of claim 33, wherein said plurality of system devices consists of
2 digital devices.

1 39. The node of claim 33, wherein said plurality of system devices consists of
2 analog devices.

1 40. The node of claim 33, wherein said plurality of system devices consists of
2 serial devices.

1 41. The node of claim 33, wherein said plurality of system devices consists of
2 digital devices, analog devices, serial devices, or combinations thereof.

1 42. The node of claim 33, wherein said network is a Controller Area Network.

1 43. The node of claim 33, wherein said network is any network compatible
2 with said node and said system devices.

1 44. The node of claim 33, wherein said user-configurable software is
2 expandable and updatable across said network.

1 45. The node of claim 33, wherein said memory further comprises a volatile
2 memory module and a non-volatile memory module.

1 46. The node of claim 33, wherein said microprocessing subunit further
2 comprises a microprocessor chip.

1 47. The node of claim 33, wherein said microprocessing subunit further
2 comprises an address and data bus interface in communication with said
3 memory.

1 48. The node of claim 33, wherein said microprocessing subunit further
2 comprises an asynchronous serial port in communication with a serial device
3 transceiver in communication with a high-speed serial interface connector.

1 49. The node of claim 33, wherein said microprocessing subunit further
2 comprises a synchronous serial port in communication with a synchronous
3 serial port interface connector.

1 50. The node of claim 33, wherein said microprocessing subunit further
2 comprises a background debugging monitor in communication with a
3 background debugging monitor interface connector.

1 51. The node of claim 33, wherein said microprocessing subunit further
2 comprises a network interface in communication with a network connector.

- 1 52. The node of claim 33, wherein said microprocessing subunit further
2 comprises an analog to digital converter in communication with an analog to
3 digital and digital I/O interface connector.
- 1 53. The node of claim 33, wherein said microprocessing subunit further
2 comprises a time processing unit in communication with a switch array in
3 communication with a digital I/O and RS-232 interface connector.
- 1 54. The node of claim 33, wherein said plurality of inputs/outputs further
2 comprises a plurality of digital input/outputs.
- 1 55. The node of claim 33, wherein said plurality of inputs/outputs further
2 comprises a plurality of analog input/outputs.
- 1 56. The node of claim 33, wherein said plurality of inputs/outputs further
2 comprises a plurality of serial input/outputs.
- 1 57. The node of claim 33, wherein said plurality of inputs/outputs consists of
2 a plurality of digital input/outputs, analog input/outputs, serial input/outputs,
3 or combinations thereof.
- 1 58. The node of claim 33, wherein said power supply operates within a range
2 of about 8 to 32V DC.
- 1 59. The node of claim 33, wherein said power supply draws its power from
2 either an external power source or the power supply to said network, and
3 automatically chooses said external power supply when both sources of
4 power are available.
- 1 60. The node of claim 33, wherein all components of said node are
2 ruggedized to prevent damage resulting from use of said node in high shock
3 or high vibration environments.

1 61. The node of claim 33, wherein said node operates within a temperature
2 range of about minus 40°C to 85°C.

1 62. The node of claim 33, wherein said node is installed in landcraft, aircraft,
2 or watercraft.

1 63. A system for automated control of a plurality of system devices,
2 comprising:

3 (a) a node for providing a common interface for said plurality of
4 system devices, further comprising: user-configurable software for
5 providing a software interface for said plurality of system devices; and
6 multifunctional hardware for providing a hardware interface for said
7 plurality of system devices;

8 (b) a plurality of digital, analog, serial, or other system devices in
9 communication with said node by means of a network; and

10 (c) a processing unit in communication with said node by means of
11 said network for communicating with and controlling said system
12 devices.

1 64. A method for communicating with a variety of system devices from at
2 least one processing terminal, comprising:

3 (a) connecting said system devices to a multifunctional network
4 interface node further comprising a user-configurable software
5 interface; and a hardware interface, whereby said node standardizes
6 the voltage output levels and electronic communications protocols of
7 said system devices; and

8 (b) connecting said multifunctional network interface node to a
9 processing unit by means of a network, whereby said information from
10 said system devices may be received and processed, and commands
11 may be sent to said system devices.